Catalog Number 2458

Data Logging Rain Gauge

USER MANUAL

February 2005 Edition 1

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Section 1 Specifications

Specifications are subject to change without notice.

Rain Gauge	
Type	Tipping bucket with 8” diameter collector/funnel
Overall Dimensions	45.7 x 30.5 x 30.5 cm (18 x 12 x 12 in.)
Weight	4.2 kg (9.25 lb)
Resolution	0.01” rainfall per bucket tip
Accuracy	0.5% at 0.5” per hour
Base Mounting Plate	Spring loaded, 3-point adjustable
Materials of Construction	Epoxy coated aluminum and Anodized Aluminum (funnel screen is stainless steel)
Rain Logger	
Enclosure	Impact resistant plastic
Type	Solid state memory, battery backed
Dimensions	2.54 x 7 x 10.5 cm (1 x 2.75 x 4.125 in.)
Weight	8.5 oz (0.24 kg)
Electronics	CMOS, protected to NEMA 4x, 6 requirements
Operating Temperature	0 to 57 °C (32° to 135 °F)
Storage Temperature	–29° to 66 °C (–20° to 150 °F)
Power Requirements	Replaceable 9 VDC alkaline battery
Battery Life	6 months, typical
Data Capacity	10,080 readings (i.e. 7 days at 1 minute recording intervals, 70 days at 10 minute recording intervals)
Time Base Indicator	L.E.D. flashing once every 2.5 seconds indicates a good battery. 2–3 days of remaining battery life when the L.E.D. stops flashing.
Data Interface	L.E.D. optically coupled RS232 interface
Rain Reader	
Enclosure	Impact resistant plastic
Dimensions	2.54 x 7 x 10.5 cm (1 x 2.75 x 4.125 in.)
Weight	8.5 oz (0.24 kg)
Electronics	CMOS
Power Requirements	9 VDC, nominal; supplied via 115 VAC/9 VDC power adapter
Data Interface	L.E.D. optically coupled RS232 interface
Data Transfer Rate	4800 baud (fixed)
Computer Interface	RS232 serial cable, IBM PC compatible
InSight Software	
Hardware Requirements	Pentium PC with 133 MHz or higher processor
	Windows 95, 98, 2000, NT 4.0, or XP operating systems
	Minimum 64 Megabytes RAM
	Minimum 100 MB available hard drive space
	9-pin serial port or 25-pin serial port with 9-pin adapter
	VGA Graphics display with 800 x 600 or higher resolution, 256 colors
	Mouse
	Color printer for output of reports and graphs is recommended

Section 2 General Information

2.1 Safety Precautions

Please read this entire manual before unpacking, setting up, or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

To ensure that the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than that specified in this manual.

2.1.1 Use of Hazard Information

DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.

Important Note: *Information that requires special emphasis.*

Note: *Information that supplements points in the main text.*

2.1.2 Precautionary Labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. .

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.

2.2 Introduction

This manual covers the Sigma Rain Logger and Remote Rain Logger systems. The Data Logging Rain Gauge, Remote Rain Gauge, and InSight software measure and record data on rainfall at a particular location. The Rain Logger systems consist of four main parts (see Figure 1).

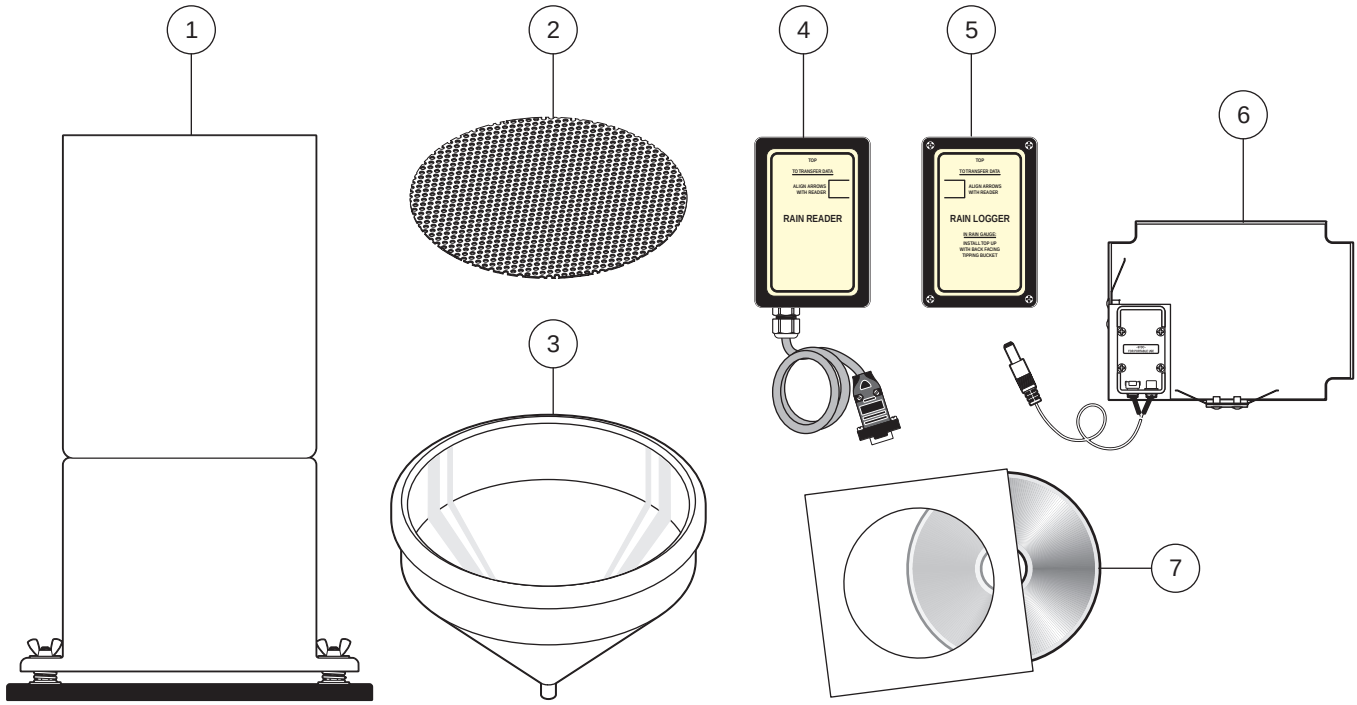
- **Rain Gauge**—A device used to measure rainfall. Measurement is based on the principle of an internal tipping bucket that is calibrated to collect 0.01 inches of rain. When this amount is collected, the bucket tips and the process is restarted. The bucket tip is recorded by the Rain Logger.

- **Rain Logger**—A pocket-sized device which records the rainfall measured by the rain gauge. It can hold 10,080 readings.

- **Rain Reader**—A pocket-sized device which provides an interface between a PC and the Rain Logger. This device connects to the serial port of the PC.

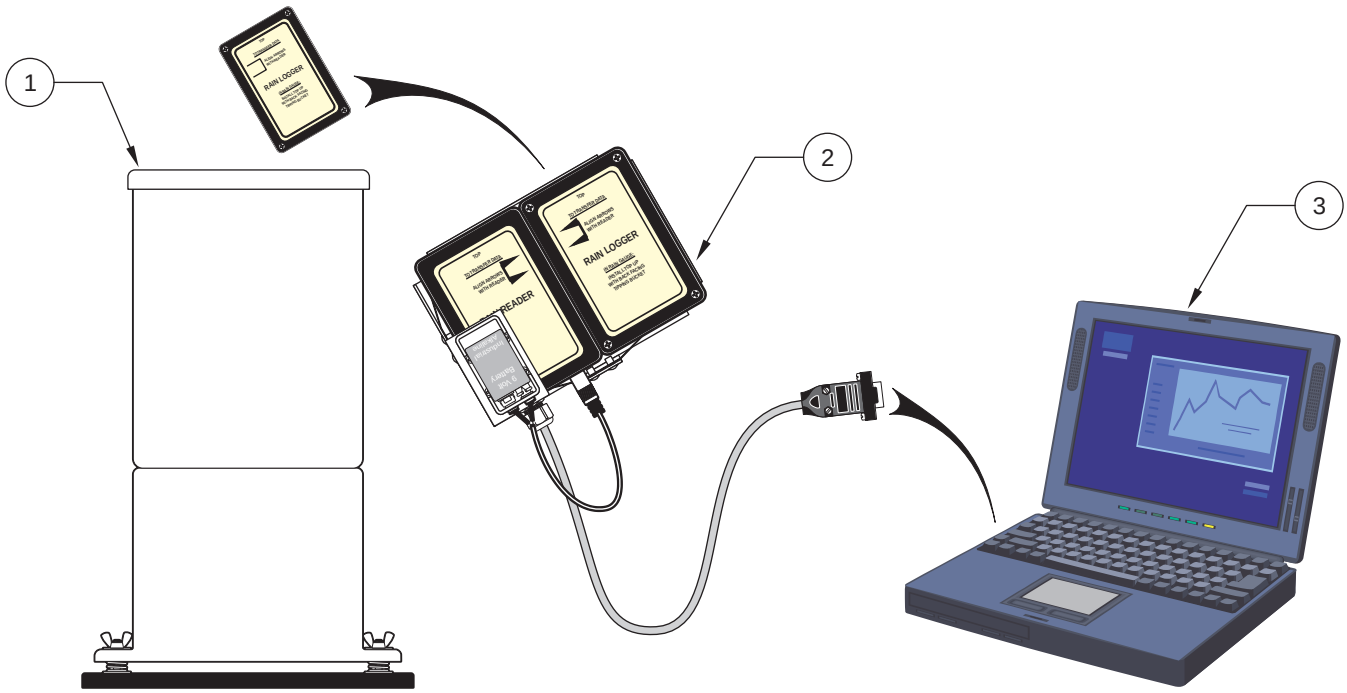
- **InSight Software**—A program which allows storing, retrieving, and analyzing of data. It is compatible with rain loggers, flow meters, and samplers. See the operating instructions that came with the InSight software for a complete description of its functions.

Figure 1 Data Logging Rain Gauge Components



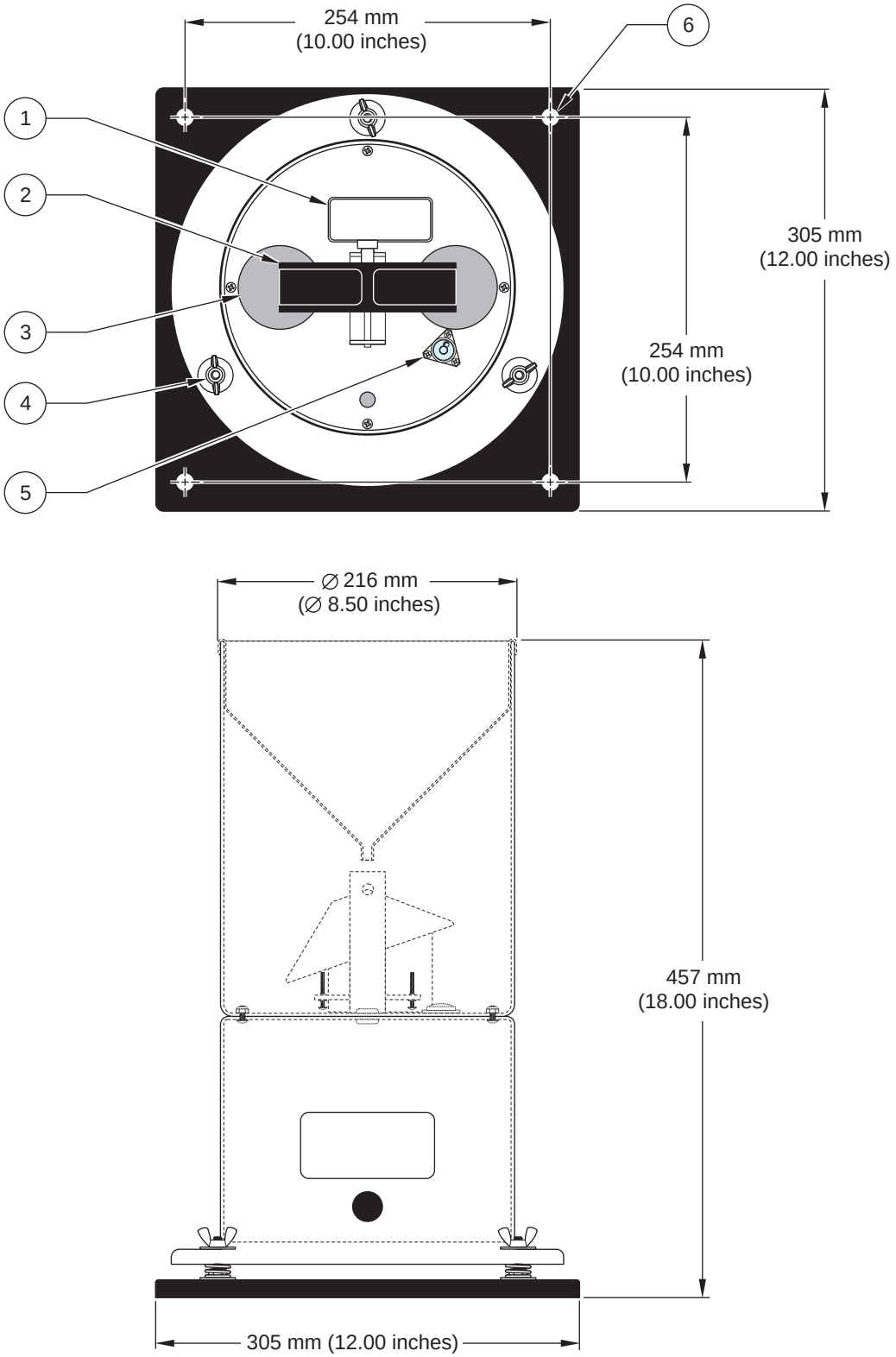
1. Rain Gauge	**5.** Rain Logger
2. Screen	**6.** Cradle
3. Funnel	**7.** CD, Insight Software
4. Rain Reader	

Figure 2 Rain Logger System



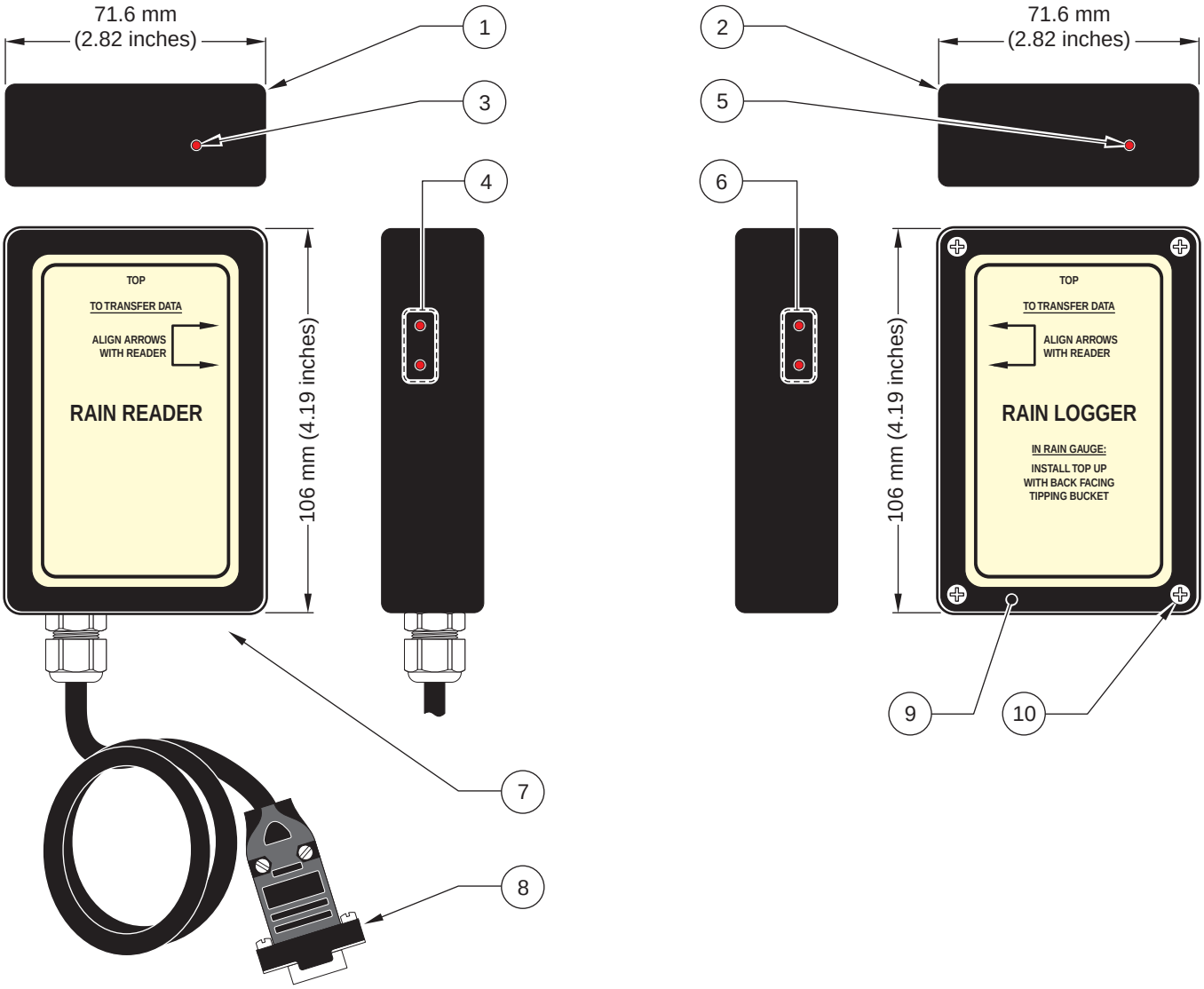
1. Rain Gauge	**3.** PC with Insight software
2. Rain Logger installed into cradle with Rain Reader	

Figure 3 Rain Gauge



1.	Sleeve, Rain Logger	**4.**	Leveling Wing nuts (4)
2.	Tipping Bucket	**5.**	Level
3.	Measured Rainfall, Drain (2)	**6.**	Mounting holes, ∅12.7 mm (∅ 0.5-inch) thru (4)

Figure 4 Rain Reader and Rain Logger



1.	Rain Reader	**6.**	Optical Communication Ports
2.	Rain Logger	**7.**	AC Power Connection
3.	LED, Power ON Indicator	**8.**	Serial Interface Cable
4.	Optical Communication Ports	**9.**	Battery Compartment Cover
5.	LED, Power ON Indicator	**10.**	Screws (4)

Section 3 Preparation of the Rain Logger

3.1 Loading the InSight Software

1. Insert the CD into the CD-ROM drive. The CD should automatically run. If the CD does not automatically run, follow the steps below:

   a. Click **START** and select the Run function.

   b. Click **BROWSE** in the Run dialog box.

   c. Browse to the CD-ROM drive on your computer and double click setup.exe.

   d. Click **OK** in the Run dialog box.

2. Follow the instructions as they appear on the screen.

3.2 Powering the Rain Logger

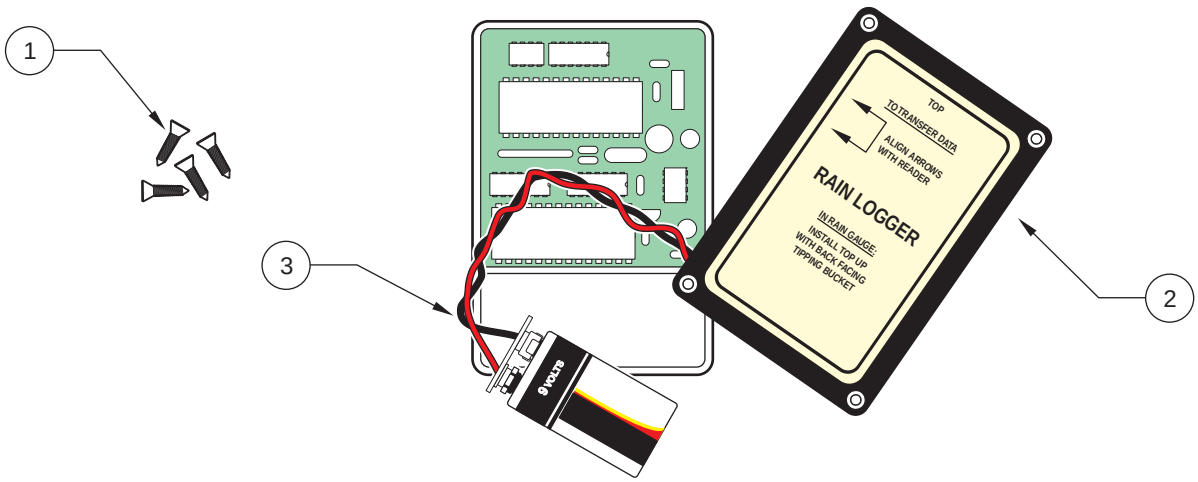
1. Remove the four screws from the face of the Rain Logger and remove the cover.

2. Attach a 9V battery to the battery clip, observing proper polarity.

3. Replace the cover and screw it into place. Be sure to replace the cover as shown in Figure 5 so that the arrows on the cover label point towards the optical communication port on the left side of the rain logger case.

Note: *Improper placement of the cover can result in no data being recorded when the Rain Logger is installed in the Rain Gauge.*

Figure 5 Battery Installation



1. Screws	**2.** Cover, Rain Logger	**3.** 9V Battery

3.3 Inserting the Rain Reader and Rain Logger in the Cradle

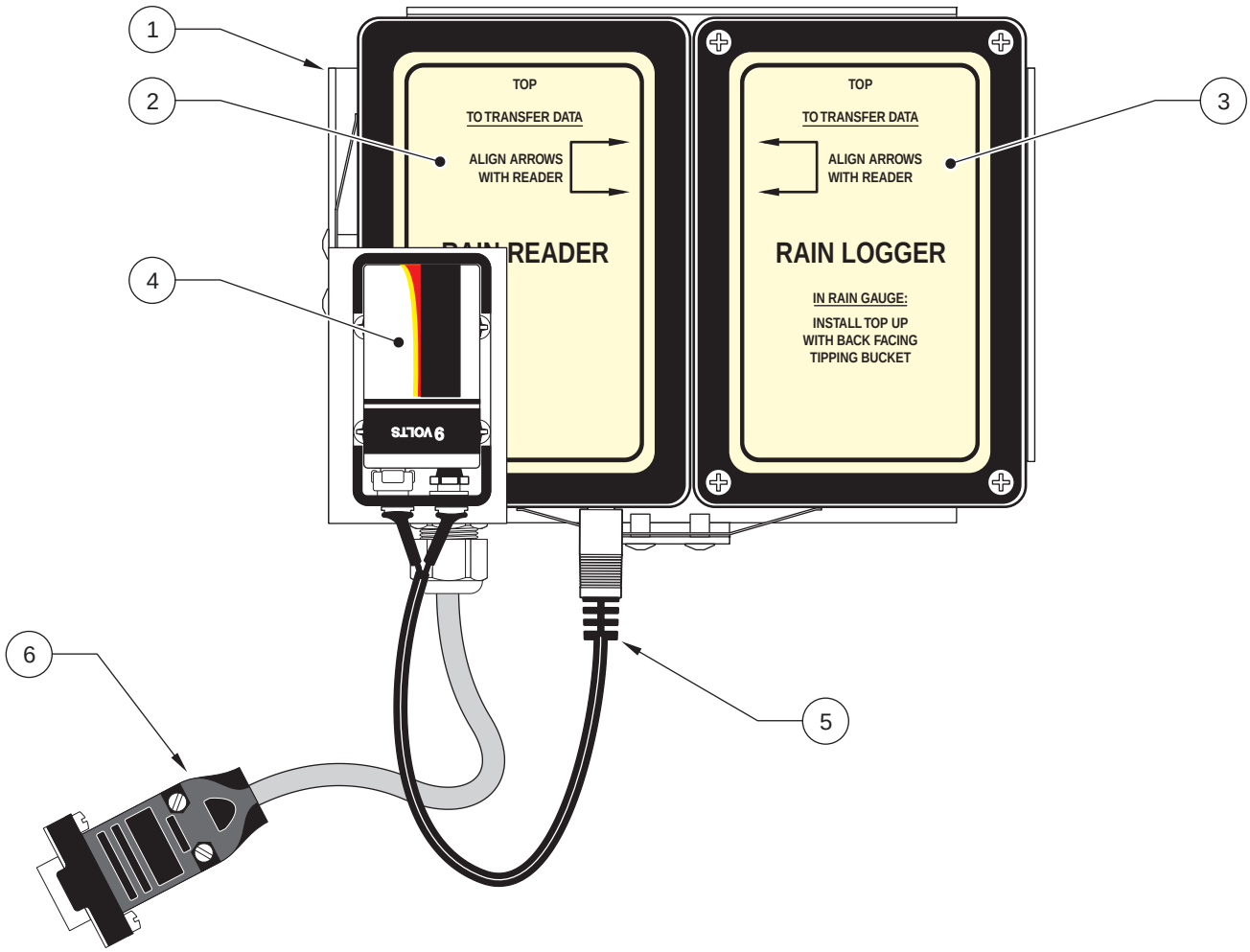
Insert the Rain Reader and Rain Logger into the cradle. Be sure the Reader is inserted before the Logger and that the labels face out (see Figure 6).

1. Insert the Rain Reader into the left side of the cradle.

2. Insert the Rain Logger into the right side of the cradle. Align the arrows on the labels of the Rain Reader and Rain Logger to point at each other.

3. Connect power to the Rain Reader using either the AC power adapter included, or a 9V battery installed on the cradle.

Figure 6 Rain Reader and Rain Logger in the Cradle



1.	Cradle	**4.**	Battery, 9V
2.	Rain Reader	**5.**	Power supply to Rain Reader (battery power or AC power)
3.	Rain Logger	**6.**	9-pin serial interface connector (Rain Reader to PC)

3.4 Programming the Rain Logger

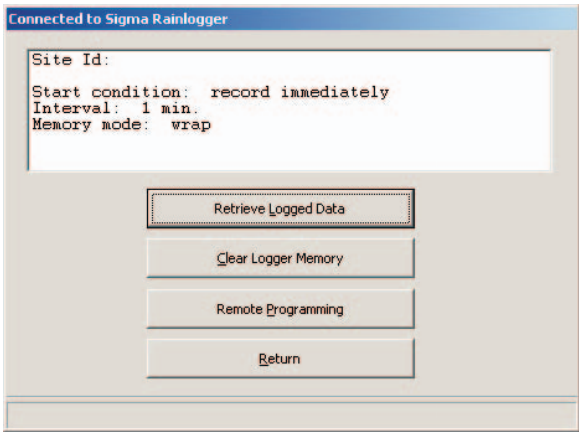
1. Connect the Rain Reader serial interface cable to the 9-pin serial port (or a 25-pin serial port with a 9-pin adapter) on your PC. If the computer has more than one serial port, make note of which one is going to be used for the Rain Reader.

2. Start up the InSight software. Select the Rain Logger from the list of instruments.

3. Select the COM port connected to the Logger. The Rain Reader baud rate is fixed at 4800.

4. Click **OK**. A Connected to Sigma Rainlogger dialog box should appear. This indicates the Rain Reader and PC are properly connected and communicating (see Figure 7). If it does not appear, see Appendix A on page 23.

Figure 7 Connected to Sigma Rainlogger



5. Once connected, click **REMOTE PROGRAMMING**..

6. Enter the information for the site where the Rain Gauge will be installed.

   - **Site Id** Enter a description for the location of the Rain Gauge.
   - **Start Condition** Use the drop-down menu to select between Record Immediately or Record on First Tip.
   - **Interval** Use the drop-down menu to enter the interval at which the Rain Logger will record the data.
   - **Memory Mode** Use Slate Mode to have the recordings stop after the memory is full. Use Wrap Mode to have the oldest data replaced with new data when the memory is full.

7. Click the clock option to program the clock. Click either **Use PC Time/Date** or **Use User-Entered Time/Date**. If selecting **Use User-Entered Time/Date**, the needed information must be manually entered in the Enter New Logger Time/Date fields. Click **PROGRAM**.

8. After the clock has been programmed, InSight returns to the Connected to Sigma Rainlogger dialog box. If the information is correct, click **OK** to return to the main menu.

9. Click the Clear Logger Memory option to clear logger data points. The site and clock information will not be erased.

10. Click **RETURN** and the logger is now programmed.

DANGER
Only qualified personnel should conduct the installation tasks described in this section of the manual.

4.1 Location

1. Install the rain gauge in a clear area away from buildings and trees which could block the natural fall of the rain. Pick a location which is as level as possible and will assure a representative sample of rainfall for the area.

2. The base plate can be mounted to any flat surface using the four mounting holes located in the corners of the plate. Attach the mounting plate to the ground with small stakes or bolts depending on the mounting surface.

Note: *If the Remote Rain Logger System is being installed, route the cable from the Rain Gauge to the place where the Remote Rain Logger housing will be located. The Remote Rain Logger housing may be located 25 ft away from the Rain Gauge with the standard cable, or up to 125 ft away using the optional 100 ft extension cable.*

4.2 Leveling the Rain Gauge

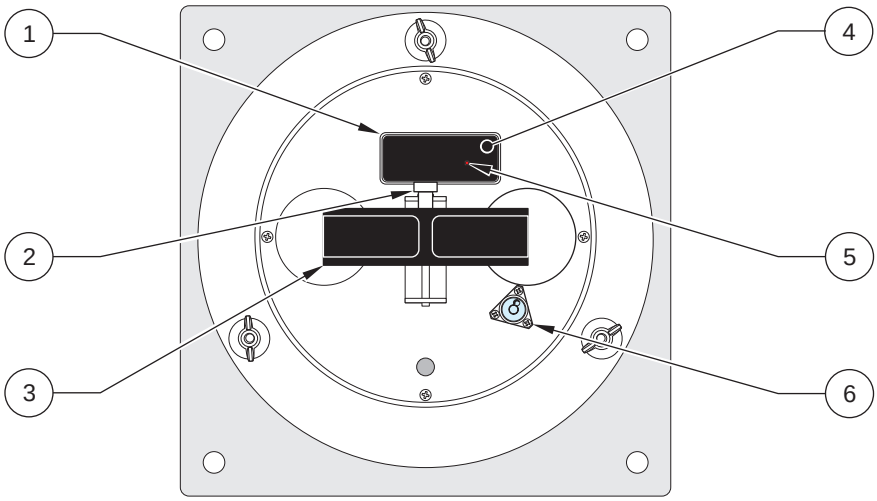
For accurate rainfall measurements, the rain gauge must be levelled using the internal bulls-eye level located inside the gauge.

1. Remove the screen and rain gauge funnel. Be sure that no packing material is inside or under the gauge and that the tipping bucket can move freely about the pivot point.

2. Using the three wing nuts located on the base, adjust the gauge so that the air bubble is centered in the circle of the bulls-eye level.

If the Remote Rain Logger System is being installed, replace the screen and the rain gauge funnel and go to Section 4.4 on page 14.

Figure 8 Inside the Rain Gauge



1. Sleeve, Rain Logger	**4.** Rain Logger (installed)
2. Sensor, Tipping Bucket	**5.** Power ON Indicator
3. Tipping Bucket	**6.** Level

4.3 Installing the Rain Logger

1. Slide the Rain Logger into the mounting sleeve in the Rain Gauge with the side marked **TOP** up (see Figure 8).

Note: *Use care not to tip the bucket during Rain Logger installation since false rainfall will be recorded. Incorrect placement of the Rain Logger in the Rain Gauge will result in no recorded data.*

2. Replace the screen and the rain gauge funnel.

4.4 Remote Rain Logger System

1. Remove the top cover of the Remote Rain Logger housing by rotating it counter-clockwise to unscrew it from the housing (see Figure 10).

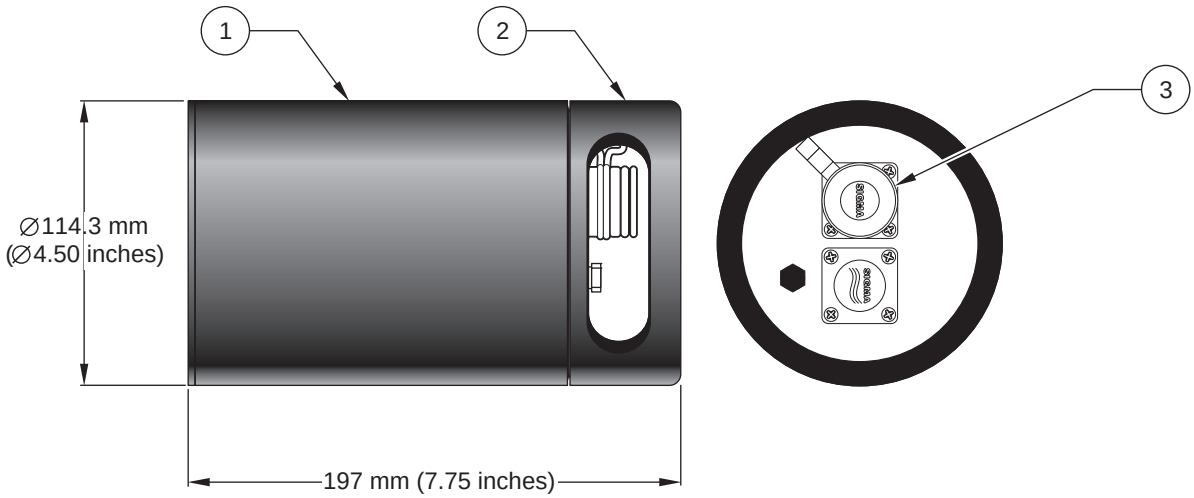
2. Install the Rain Logger in the metal bracket by sliding the top of the Rain Logger into the leaf springs and snapping the bottom of the Rain Logger under the lip of the metal bracket. Make sure that the arrows on the Rain Logger label face the same direction as the arrows on the bracket label.

3. Install two 9V batteries in the holders located on the metal bracket, observing proper polarity.

4. Replace the top cover of the Remote Rain Logger housing.

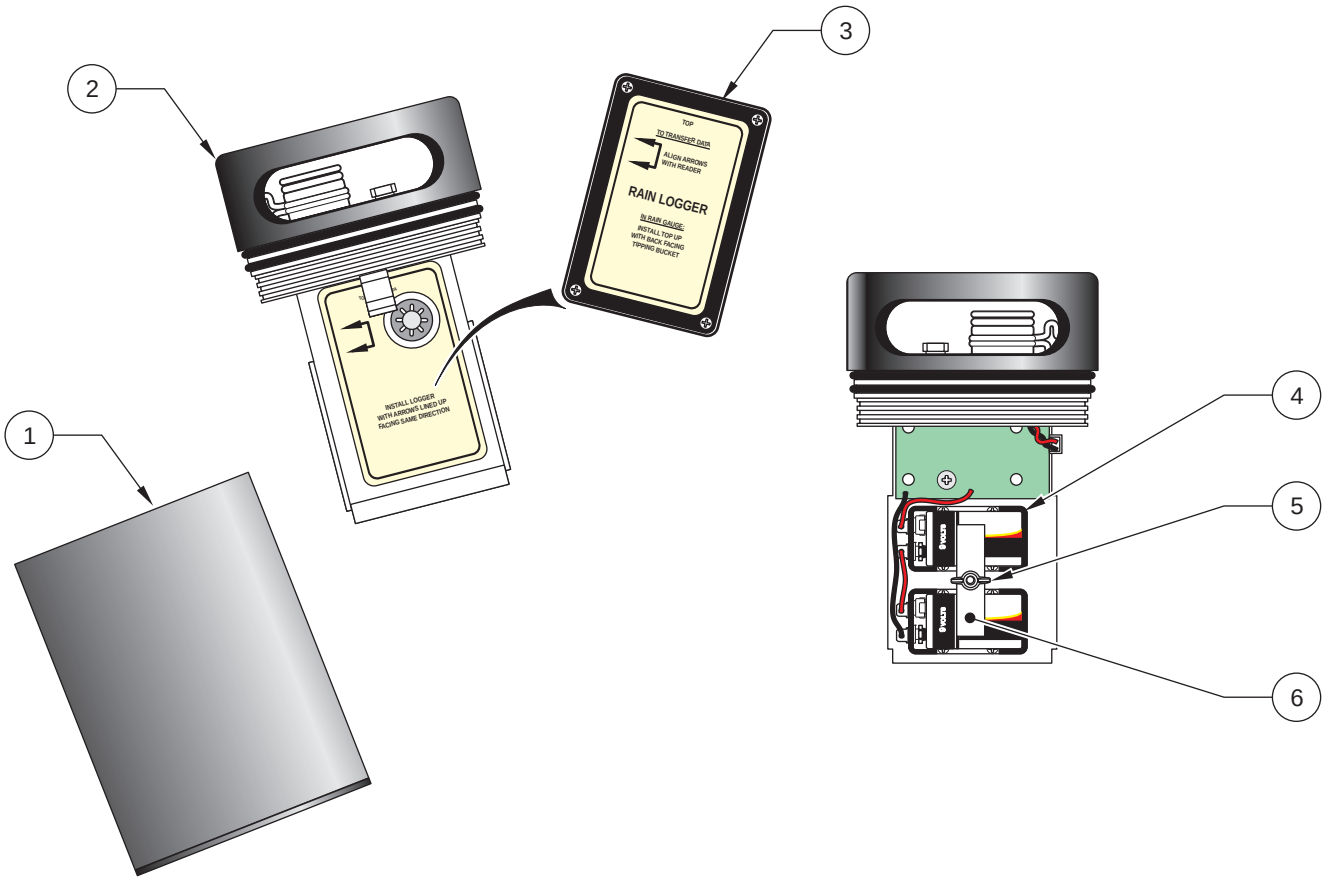
5. Attach the cable from the Rain Gauge to the connector on the top of the Remote Rain Logger housing.

Figure 9 Remote Rain Logger Overview



1.	Housing, Remote Rain Logger Body
2.	Top Cover, Remote Rain Logger
3.	Connector

Figure 10 Remote Rain Logger

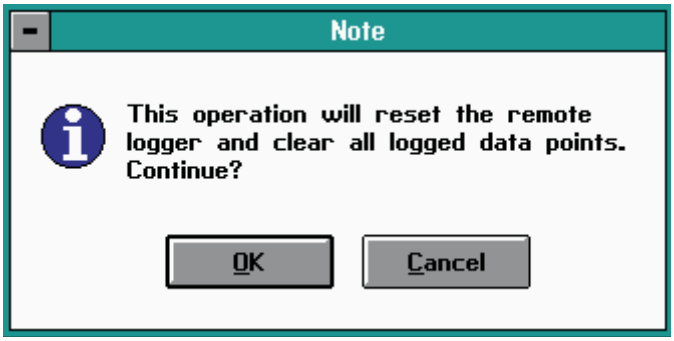


1. Housing, Remote Rain Logger Body	**4.** 9V Battery (2)
2. Top Cover, Remote Rain Logger	**5.** Wing nut
3. Rain Logger	**6.** Bracket

5.1 Retrieving Data from the Rain Logger

1. Remove the screen and funnel from the Rain Gauge.
2. Carefully remove the Rain Logger from the bracket.
3. It is recommended to clean the Rain Gauge and tipping bucket while the Rain Logger is removed so false data won't be recorded.
4. Insert the Rain Reader and Rain Logger in the cradle as it was done during programming (see Section 3.3 on page 9).
5. Be sure the Rain Reader serial interface cable is connected to the 9-pin serial port (or a 25-pin serial port with a 9-pin adapter) on your PC. If the computer has more than one serial port, make note of which one is going to be used for the Rain Reader.
6. Start up the InSight software.
7. Select the Rain Logger from the list of instruments.
8. A Connected to Sigma Rainlogger dialog box should appear. This indicates the Rain Reader and PC are properly connected and communicating (see Figure 7 on page 11). If it does not appear, see Appendix A on page 23.
9. Once connected, click **RETRIEVE LOGGED DATA**. This will retrieve and store all data from the logger onto the PC. See the InSight manual for information on Data Analysis. **Be sure all data is store successfully before continuing.**
10. If all data was stored, click **CLEAR LOGGER MEMORY**. This will erase all rainfall data from the Rain Logger.

Figure 11 Clear Logger Memory



11. Click **OK** to confirm.
12. If needed, make changes to the programmed information (Interval, Start Condition, or Memory Mode) by clicking **REMOTE PROGRAMMING**.
13. Click **RETURN** and the logger can now be returned to the Rain Gauge.

14. Slide the Rain Logger into the mounting sleeve in the Rain Gauge with the side marked Top up (Figure 8 on page 13).

Note: *Use care not to tip the bucket during Rain Logger installation since false rainfall will be recorded. Incorrect placement of the Rain Logger in the Rain Gauge will result in no recorded data.*

15. Replace the screen and the rain gauge funnel.

Section 6 How to Order

Ordering Information for the U.S.A.

By Telephone:
(800) 635-4567

By Fax:
(970) 461-3915

By Mail:
Hach Company
P.O. Box 389
Loveland, Colorado 80539-0389
U.S.A

Ordering information by E-mail:
orders@hach.com

Information Required

- Hach account number (if available)
- Your name and phone number
- Purchase order number
- Brief description or model number
- Billing address
- Shipping address
- Catalog number
- Quantity

Ordering Information for Outside the U.S.A. and Europe

Hach maintains a worldwide network of dealers and distributors. To locate the representative nearest you, send e-mail to intl@hach.com or visit www.hach.com.

Technical Support

Technical and Customer Service Department personnel are eager to answer questions about our products and their use. In the U.S.A., call 1-800-635-1230. Outside the U.S.A. and Europe, send e-mail to intltech@hach.com.

Repair Service

Authorization must be obtained from Hach before sending any items for repair. Please contact the Hach Service Center serving your location.

Hach Company
P.O. Box 389
Loveland, Colorado, 80539-0389 U.S.A.
Telephone: 1-800-635-1230 or (970) 669-3050
Fax: (970) 669-2932

Section 7 Contact Information for Europe

For technical support, repair service, and ordering information please refer to the contact information below for your specific country. For additional information, visit www.hach-lange.com.

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Section 8 Warranty

Hach Company warrants this product to the original purchaser against any defects that are due to faulty material or workmanship for a period of one year from date of shipment.

In the event that a defect is discovered during the warranty period, Hach Company agrees that, at its option, it will repair or replace the defective product or refund the purchase price, excluding original shipping and handling charges. Any product repaired or replaced under this warranty will be warranted only for the remainder of the original product warranty period.

This warranty does not apply to consumable products such as chemical reagents; or consumable components of a product, such as, but not limited to, lamps and tubing.

Contact Hach Company or your distributor to initiate warranty support. Products may not be returned without authorization from Hach Company.

Limitations

This warranty does not cover:

- Damage caused by acts of God, natural disaster, labor unrest, acts of war (declared or undeclared), terrorism, civil strife or acts of any governmental jurisdiction
- Damage caused by misuse, neglect, accident or improper application or installation
- Damage caused by any repair or attempted repair not authorized by Hach Company
- Any product not used in accordance with the instructions furnished by Hach Company
- Freight charges to return merchandise to Hach Company
- Freight charges on expedited or express shipment of warranted parts or product
- Travel fees associated with on-site warranty repair

This warranty contains the sole express warranty made by Hach Company in connection with its products. All implied warranties, including without limitation, the warranties of merchantability and fitness for a particular purpose, are expressly disclaimed.

Some states within the United States do not allow the disclaimer of implied warranties and if this is true in your state the above limitation may not apply to you. This warranty gives you specific rights, and you may also have other rights that vary from state to state.

This warranty constitutes the final, complete, and exclusive statement of warranty terms and no person is authorized to make any other warranties or representations on behalf of Hach Company.

Limitation of Remedies

The remedies of repair, replacement or refund of purchase price as stated above are the exclusive remedies for the breach of this warranty. On the basis of strict liability or under any other legal theory, in no event shall Hach Company be liable for any incidental or consequential damages of any kind for breach of warranty or negligence.

Appendix A Troubleshooting

A.1 Replacing the Battery

The 9V batteries in the Rain Logger and Remote Rain Logger typically last for 6 months. An L.E.D. flashing once every 2.5 seconds indicates a good battery. When the L.E.D. stops flashing, two to three days of battery life remain but it is recommended to replace the battery immediately at that time.

A.2 Cleaning the Rain Gauge

Every time the Rain Logger is removed to record the data, clean the Rain Gauge with a soft, wet cloth. Pay particularly close attention to the following areas:

- Be sure the tipping bucket can still tip on its axis. Debris can cause inaccurate readings.
- Be sure the funnel is not clogged and thoroughly clean the screen. Debris covering the screen or in the funnel can cause inaccurate readings.
- Check all connections including the Rain Logger bracket for signs of damage or interference that may cause inaccurate readings.

A.3 RS232 Connection

Use Table 1 to determine what the problem was when attempting to connect the Rain Reader with your PC. If all else fails, contact Technical Support.

Table 1 RS232 Connection Errors

Possible Problems	Solutions
The RS232 cable and receptacle are not in good condition or tightly connected.	Replace cable or tighten connection.
The com port is not enabled on your PC.	Examine your hardware profile and check your computer manual. Common settings are: COM 1 IRQ 4 Address O3F8 COM 2 IRQ 3 Address O2F8 COM 3 IRQ 4 Address O3E8 COM 4 IRQ 3 Address O3E8
The unit does not have adequate power supply. (Check Status screen)	Check the fuses and evaluate the power supply.
The 9-pin and 25-pin connections are not working properly.	Try a different computer and check the cable with an Ohm meter.

A.4 Problem Recording Data

If the Rain Logger is not recording any data from the tipping bucket:

- Check that the screen is free of debris and that water can run through the funnel to the tipping bucket.
- Check that the tipping bucket can tip, debris or shipping material might block the tipping bucket from recording data.
- Check that the Rain Logger is properly installed. Center the Rain Logger in the bracket in the Rain Gauge. There is enough movement where the Rain Logger doesn't pick up rain data occasionally.
- After replacing batteries, check the cover of the Rain Logger. If the cover is turned around, the Rain Logger is improperly installed.

After replacing batteries, check that the red power LED is flashing. This is a visual indication that the unit is running properly.